Dear Reviewer,

Thank you very much for your positive comments on our paper "Variable anisotropy of small-scale stratospheric irregularities retrieved from stellar scintillation measurements by GOMOS/Envisat". We will introduce all suggested technical corrections. Below we present the replies to your specific comments/questions.

Reviewer #2
Specific comments:

On page 7 (line 191) the authors state that "the condition for tangential occultations are realized seldom." Why seldom? If the line of sight is directed almost perpendicularly to the plane of satellite orbit, toward the Earth horizon the tangential occultations for an appropriate star by the atmosphere should happen as frequently as the vertical occultations. If conditions for tangential occultations indeed take place seldom what are circumstances responsible for the seldom appearance of these events? Is this just an engineering issue related to a fixed pointing direction for the sensor, or due to a choice of specific stars?

The most unfortunate limitation of the data analysis presented in the paper is averaging of the sought turbulent characteristics over all available lon/lat locations. It means that dependence of spectral parameters over the geographic coordinates is lost. Is there any prospect of relaxing this limitation in the future analysis, or this is the best what can be done under circumstances? According to Table 1 the tangential occultations were limited to the Northern hemisphere. Why it is so?

Authors:

Indeed, the conditions for tangent occultations with quasi-horizontal trajectories near the minimal ray perigee altitude h_0 occur relatively rarely. We wrote (p.9 lines 1-2 of the AMTD paper) that GOMOS tangent occultations (h_0=0 - 100 km) can be observed if the star angular distance is $\theta = 28.4^0 - 25.5^0$, i.e. in a range of 3° only. For h_0 in the range 20 - 50 km, the corresponding range of θ is less than 1^0 ($\theta = 27.2^0 - 26.4^0$). An additional restriction is the use of bright stars for a better signal-to-noise ratio.

Strictly speaking, the occultations, which are close to purely vertical $\delta\alpha \approx 0^0$, also occur relatively rarely; they are observed when $\delta\theta \approx \delta\alpha$. However, for anisotropic irregularities, the condition of quasi-vertical occultation (i.e., when a light ray crosses atmospheric irregularities mainly in the vertical direction) is $tg\alpha \le \eta$ (Dalaudier et al., 2001; Kan, 2004). If the anisotropy coefficient $\eta \ge 10$, occultations with $\alpha \le 84^0$ can be considered as quasi-vertical. Therefore, the large anisotropy of stratospheric irregularities allows considering the majority of GOMOS occultations as quasi-vertical. At the same time, strong anisotropy limits the duration of quasi-horizontal parts near the minimal altitude in horizontal occultations.

Furthermore, the limited number of tangential occultations performed by GOMOS is not only due to rarity of such events for bright stars, but also to the need of a special program for performing such occultations (tangential occultations are of longer duration and require specific star tracking). The return to standard observation program causes a loss of measurements during 5 successive orbits. Therefore, the number of GOMOS tangential occultations is limited. They were performed in autumn 2002 for several stars on successive orbits. For these stars, ray perigee altitudes are in the Northern Hemisphere. Altogether, 32 tangent occultations have been performed. In our analysis we used the data from 12 tangent occultations, in which the conditions of weak scintillations are satisfied. Such limited dataset does not allow studying spatio-temporal dependence.

After the first malfunctioning of GOMOS steering front mechanism in 2003 and the restriction of its movement in azimuthal direction in 2005, tangent occultations were not even planned. We will add this note in the revised version. Unfortunately, Envisat was lost in 2012 and GOMOS measurements ceased.

Our further plans on study of anisotropy using tangential occultation include a possible extension of the altitude range below 30 km, the region of strong scintillations.